

ABSTRACT OF THE DISCLOSURE

A semiconductor device having a trench element separation region is disclosed. A pad oxide film (2), and a silicon nitride film (3) may be formed on a semiconductor substrate (1). A trench (4) may be formed by dry etching using the silicon nitride film (3) as a mask. The silicon substrate (1) may be thermally oxidized using the silicon nitride film (3) as an oxidation mask and a modified layer may be formed on the surface of the silicon nitride film (3). The modified layer may be removed by a neutral radical containing fluorine. The surface of the silicon nitride film (3) may be etched by a predetermined thickness. A filling insulation film may be deposited to completely fill the trench (4). The insulation film may then be chemical mechanical polished using the silicon nitride film (3a) as a polishing stopper to form a trench element separation insulation material (8).